Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

quarter snail *v*, the hour wheel T, and the front part of the axis of the centre wheel C.

Fig. 15 is a front view, and

Fig. 16 a view of the upper side of the stud wheel S, the hour pinion *s*, and the stud *q*, on which they turn.

No. XVII.

PORTABLE BRIDGE OF SUSPENSION.

The ***GOLD VULCAN MEDAL*** *was this session voted to* ***COLIN SHAKESPEAR****, Esq., postmaster-general, Calcutta, for his Portable Rope Bridge of Suspension. The following communication was received on the subject; and a model of the bridge has been placed in the Society's repository.*

SIR, Kentish-Town, October 13, 1824.

IN consequence of the personal interview I was honoured with by you, I beg leave, by the desire of Mr. Colin Shakespear of the Bengal Civil Establishment, to present to the Society of Arts, Manufactures, and Commerce, a model of a rustic portable rope bridge of tension and suspension, which has been introduced into use in India with acknowlenged benefit and advantage to the public service.

The description and other papers which accompany the model, Mr. Shakespear trusts will establish this fact, and encourage him to hope that the advances he has made in the construction of the bridge of which this is the model, and the still larger one, of double the space, that he is constructing, to be thrown over the Caramanssa river, will render the invention not unworthy of the honourable notice of the Society.

I am, Sir,
&c. &c. &c.
CHRIS. BIDEN,
Commander of H. C. ship
Princess Charlotte of Wales.

A. Aikin, Esq.
Secretary, &c. &c.

General Post-office, Fort William,
Calcutta, March, 1823.

THIS model of a rustic bridge of tension and suspension, for foot passengers, light cattle, carriages, &c. is on a scale of two feet to an inch.

The span of the arch between the transom rollers is eighty feet. The four graduating links, on which the roadway of split bamboo is laid, measure 120 feet. The setting up lanyards, which connect the dead-eyes, extend five or six feet each way beyond the rollers, or points of suspension.

The width is five feet; the road way is *only* raised eight feet from the ground, on friction rollers, resting on crutches, independent of the standard piles, a clear wind way being all that is necessary over torrents and streams not navigable.

The lifts radiating from each grade are carried out on the land side, forming equal angles.

They pass over friction sheaves, morticed close together by a cheek on the head of the piles.

The pressure on the uprights is thus equalized, or perpendicular, having no lateral drag.

These lifts are also made to act equally by separate horizontal preventer braces, and thimbles, passing from one grade to another, and keeping all square.

To check vibration, four diagonal guys are projected each way from the centre of the bridge itself, to the banks of the nullah, where posts are fixed, fifty or sixty feet distant from the standards, in a right line with them, having a block at the head, so that the action of these guys becomes parallel with the level of the bridge.

The model was invented in December, 1822, and the bridge itself, on this principle, without any alteration, was completed in March following, on the Esplanade, opposite the general post-office, Calcutta.

The bridge erected on this scheme for the Berrai torrent is double the scale of the model, or 160 feet between the standards (and nine feet wide) which is allowing 15 or 16 feet clear of the banks of the nullah on each side, the nullah being 130 feet.

The strands, in five graduating double links, are nearly 200 feet in length, decreasing in substance towards the centre, where the strain and stress is the least. They are all of tarred coir rope, three, four, and five inches only in circumference. The setting-up lanyards are Europe hemp rope.

The roughest material of wood has been used, not only to show that strength and economy are the chief requisites, but that rough timbers of twenty-five or thirty feet in length and about one foot in diameter at the bottom (which allows of four or five feet under ground) can be got in any part of the country where the bridge may be required. The main rollers, or points of suspension, are only raised six feet, the banks being high, and the nullah not navigable. In this experiment, when the rope had been sufficiently stretched, a graceful arch was exhibited of 160 feet span, and nine feet wide.

If any trees happen to be found growing near the banks of nullahs, they will, in their natural state, afford the best possible support.

No pier-heads or abutments are necessary, but the banks should be secured by piles, if the soil is loose and crumbling.

The general section of the water-course should determine the width of the catenary arch to be suspended over it. All projecting abutments, which diminish the channel of a torrent, being injudicious.

In proof of the extreme simplicity of the mechanism, the rope work of the bridge forming the catenary arch was twice set up and taken down, both by moon-light and torch-light, in the course of a few hours.

The second time the whole of the standards and rising platforms were removed, and nothing was seen of the bridge in the morning, which at sunset had been viewed complete.

It is the characteristic of this design so to subdivide every strain and weight as to render the component parts easily subordinate to human power, whether in putting the bridge together, or taking it to pieces, removal from place to place, re-erecting, adjustment, or repair.

The contraction and expansion of the strands may occasion a small rise and fall, but the variation of the temperature of the atmosphere will not derange the rope bridge. If the tension should become considerable in wet weather, a single person can with facility ease off the running lanyards of the setting-up power.

It is not, however, the quality of coir to dilate or constrict in the same degree with Europe hempen rope, than which it is more durable,one fifth lighter, and about half the price. It is also buoyant, which property may eventually prove very advantageous to rope bridges of this kind.

(Signed) COLIN SHAKESPEAR,
Postmaster-General.

Reference to the figures of Mr. Shakespear's Bridge of Suspension, plate XV.

Fig. 1, a bird's-eye view of part of the bridge, the floor being removed to show the ropes; both ends being alike, the other end is not shown.

Fig 2 a side elevation of ditto.

Fig. 3 an end view, showing the ascent to the bridge.

Fig. 4 a sectional elevation from the bridge or river side of the standards *a a; b b* two props on the river side; *c c* props on the land side; *d d d d d* piles driven in the ground, on which are hooked dead eyes *e e e e e*; *f f f f f* the upper dead eyes connected by the lanyards *g g g g g*; *h h h h h* the main tension ropes to support the floor; these pass over a strong roller *i i* with grooves to receive the five pairs of ropes; this roller is well supported behind the standards *a a*; the tension ropes *h h* do not pass in one length over the river, but are connected by clamps and thimbles at the intervals *j j j* (one of these clamps is shown separate fig. 5); these ropes are all separately tightened by their lanyards *g g,* the end of which passes through the block *k,* and round the windlass *l l* for that purpose, (the block *k* is attached to the bar *m m* affixed to the props *b b*), and each lanyard as it is drawn sufficiently tight is taken from the windlass, and made fast to its peg or cleat in the strong bar *n n* under the roller *i*; *o o* two props reaching from the standards *a a* to the two outer piles *d d.* Strong metal rods pass through the clamps at *j j j,* and through the thimbles of the suspension ropes *p p q q* and *r r*; *s s* a swing rope which helps to support the bridge by means of the metal rods *t t t* rising from the cross rods *j j j,* and also forms a bulwark or fence: these four pairs of ropes *p q r s* pass over pulleys on the sides of the standards *a a,* and are made fast to the piles *v v v v*; *u u* a stay from the top of the standard to the farthest pile: though these ropes are placed orderly to show them, yet they should be so placed as to make the angles on each side of the standard equal, in which case there is no bias on the standards, they have then only to bear the weight, the pulleys equalizing the tension on both sides: the rods *t t t* are kept steady by brace ropes *w w.* *x x* fig. 2, the floor of the bridge made of bamboo (part of which is shown separate in fig. 6); they are tied together at their ends, and reach from standards to standards across the river; the rest of the flooring is made of wood resting on frames morticed into the posts or bearers *y y y y y y*; this framing and part of the floor is shown in fig. 7; a net work fence is extended from the piles *z z* on each side of the bridge to similar piles at the other end, and supported by the top of the posts *y* and rods *t.* Figs. 3 and 4 show the cross bracing by which the standards *a a* are united; the five ropes *h h* forming the bridge are lashed together by small ropes at different places between the clamps, and are farther united by having bamboos lashed across on each side of the clamps, and close to the middle rod on each side of it. As this requires very secure fixing, the guys A A A A being attached to it to secure the bridge from swinging or vibrating; these guys continue to the shore, and are made fast to trees or piles placed in a line with the standards *a a,* and as high as the bridge, that their action may be in its plane. Fig. 8, part of the middle rod.

Calcutta Goverment Gazette, August 7, 1823.

The Post-Master-General's portable Rustic Bridge of Tension and Suspension.

Of this unique structure the public have heard but little since it so suddenly disappeared in toto from our view on the Esplanade in May last. We have therefore had much pleasure in learning that, under the auspices of government, it was shortly after thrown over the Berai nullah, about eighty miles from Calcutta on the great Benares road, and has been in full use ever since the setting in of the rains, to the accommodation of thousands of people, cattle with merchandize, light hackeries, a detachment of native troops, which, in passing, nearly covered the whole surface, the public mails and banghys, travellers in palankeens, &c. &c. who otherwise must have been pulled over this dangerous torrent in fragile floats, often fatal to poor people.

It is the opinion of several officers, engineers, and others, who have passed over the bridge where it now stands, that it is quite equal to the weight of a field-piece with its carriage, &c.

We have been favoured with the perusal of a letter from an experienced officer, from which we are permitted to quote the following very interesting passages:

" I reached the Berai nullah about 11 A. M. 19th July, when the torrent was rushing down with great violence, so as to preclude the possibility of crossing it by boats or rafts of any description. I of course obtained a secure passage across this dangerous stream over the rope bridge.

" The appearance of the bridge is very beautiful, being surrounded with trees and jungle; and I was surprised to find, that notwithstanding so many thousand people and cattle had crossed it, that the centre of the bridge is still higher than the approach at either side, and the treadway appears to form a segment of an ellipse.

" The bridge appears very strong and solid, and there is little motion perceivable when crossing it; it is raised very considerably above the surface of the water, which is a judicious arrangement, as was evident to me; for when standing on the centre of the bridge, looking at the torrent rolling beneath me, a large tree, which appeared to have been torn from its roots, was seen floating down the stream, and rolled very majestically beneath the bridge.

" The bridge appears in every way most perfectly to answer the purpose for which it was intended, and, by being adopted, would be a source of the greatest convenience, safety, and comfort to every traveller whose destination might lead him across the numerous hill torrents on the road to Benares, as well as on many other routes throughout India."

The official report of the 1st inst., which we have seen, from the gentleman in charge of the bridge, says—

"Since my last report regarding the bridge, we have had the Berai nullah full for days together, and much higher than usual; still nothing has happened to injure the bridge. Trees of enormous size, with all their branches, have been brought down by the torrent, which have passed under the bridge without the slightest accident; in a word, expectation must now be fully realized, as we shall not have the nullah higher than it has been; but if we had, I should not in the least be afraid of any accident whatever."

To the foregoing satisfactory encomiums on the practical stability and simplicity of this very ingenious bridge, we have to add, that it was transported to its present position on a few common hackeries, and set up at once with ease and dispatch by the native carpenter who had constructed the wood work, accompanied by a few callaptes, and the model.

It has neither pier head, nor abutment, and the general section of the nullah has been taken. The span of the arch is 160 feet clear, by 9½ wide, which dimensions it is said exceed those of the Kally Ghaut iron chain bridge by 20 feet in length and one in width. The main transom rollers, or points of suspension, which connect with the setting up power, are only raised six feet from the ground.

The four light piles connected with them rise about 20 feet; to these friction sheaves are morticed outside, for the radiating guys springing from each grade of the rope strands, whereby the roadway is kept in equilibrio.

The whole weight in suspension is somewhere about 6,000 lbs.

Calcutta Government Gazette, 7th of August, 1823.
[First Supplement.]

New Suspension Bridge.

It is proposed to erect the new suspension bridge immediately to the eastward of the present one, without interfering in any material degree with the passage across the latter, which need not thorefore be removed until the former is completed. The road-ways leading up to the new bridge, will be formed partly with earth taken out of the nullah, and partly with the earth of the present road-ways.

The site of the new bridge, being the same as that of the original pucka bridge, the road-ways on each side and the direction of the bridge will be nearly in a straight line, and the present awkward winding approach, on the southern side, will be avoided.

The distance between the points of suspension of the new proposed bridge, will be one hundred and twenty feet, this admits of a clear water-way ninety feet broad at high water, and eighty-six feet at low water; which appears ample for the passage of boats underneath the bridge. The height of the road-way will be the same as that of the present bridge.

The depth of water under the bridge may be increased without incurring any risk of danger to the foundation of the piers, from three feet, the present depth, to seven feet.

The breadth of the road-way will be increased from nineteen to twenty-two feet, which is one foot broader than the Allypoor bridge, and which, it is presumed will be found sufficient, more particularly when the additional bridge now in contemplation, at the mouth of the nullah, shall be completed.

The road-way of the new bridge will be planked in the same manner as the Kally Ghaut bridge: over the planking a larger koah, four inches thick, will be laid, or the bridge may be paved with bricks placed edgewise, in the same manner as in some parts of the Barrackpoor road, which appears fully to answer. The road-way of the bridge will thus be, in all respects, the same as any other pucka road. And as a degree of tension will be given to the chains, sufficient to provide against any undulatory motion, there can be no reasonable apprehension, that cattle will be alarmed in crossing over.

It will be observed that the chains which sustain the bridge, fall below the rail-way as they approach the centre.

The object of this arrangement, which is different from that of the Kally Ghaut bridge, is to diminish the height of the supporting piers, and thus render them more capable of withstanding the continued shake of the chains, at the points of suspension. High piers or pillars of brick-masonry, except they are made exceedingly massy, which would inconveniently contract the entrance to the bridge, would be liable to injury from this cause. The supporting piers are twelve feet high from the foot to the upper chain. The chains rest upon iron beds, built into the masonry of the pier. The inner side of the piers is faced with stone, strongly clamped together. The intention of facing the inner side of the piers with stone, is to support more firmly the chains, which are brought close to the inner side, in order to give as great a width to the approach as possible. Indeed it would be advisable to build the piers entirely of stone. The difference of expense would not exceed 1,500 rupees.

It is proposed to suspend the road-ways from twelve chains, ranged on piers. These chains will pass over the piers as explained above, and their ends will be fixed in a mass of masonry, and buried under the road-way leading to the bridge, in the same manner as those of the Kally Ghaut bridge. The upright suspending rods will fall from the joints of the main chains, and will be attached to the beams in the road-way, nearly in the same way as has been done in the above-mentioned bridge. The railing will be made of iron, and fixed into the road-way, independent of the main-chains or suspending rods, and will therefore secure them from injury from passing carriages.

The weight of the bridge, and utmost load to which it can be subjected, and the description, and quantity of iron that will be necessary to support this weight, will be as follows:

Weight	of the chains . .	23,040 lbs.
	of the beams . .	31,500
	of the planking . .	34,650
	of the paving . .	92,358
		181,548

If the bridge were crowded with men,* each man to weigh on an average ten stone, and to occupy a space of one foot and a half square, then there will be a load on every hundred square feet of 6,222 lbs., and as the roadway contains 2,200 square feet, the weight of the load will be 136,884 lbs., or the whole weight of the bridge between the points of suspension when crowded with men, will be 318,432 lbs. or 142 tons.

---

* It is found that a given area crowded with men will have a greater weight than the same space occupied by cattle in the proportion of about nine to seven.

It is found by calculation that from the angle at which the chains are suspended, this weight will act with a tension of 274 tons. It has been mentioned above, that the bridge will be suspended from twelve chains of two inch square iron; and experiment shows, that an inch square of common malleable iron will sustain a tension of between 24 and 31 tons* without breaking; taking the smaller of these two quantities, the resisting power of the bridge will be 1152 tons, or more than four times greater than the utmost tension to which it can be subjected,† which is an allowance for strength considerably greater than has been provided for in the Union bridge, built by Captain Brown over the Tweed, and is such as must ensure the stability of the proposed work.

The present season is unfavourable for its commencement, but it is hoped that the new bridge will be opened before the commencement of the next rains.

---

* Barlow on the strength of materials, page 231 and 235.

† If loaded with elephants, the tension would be 368 tons. Even in this case there would remain a balance of strength of 784 tons.

[Calcutta Government Gazette, August 21, 1823; and Supplement.]

The Post-Master-General's Portable Rustic Rope Bridge of Tension and Suspension.

We are most happy to learn that Mr. Shakespear has been solicited by an opulent and public-spirited native of rank, Rajah Shebe Chunder Roy, to direct the construction of one of his rope-bridges to be thrown over the Caramnasso river, which intersects the great north-west road, about forty or fifty miles on this side of Benares; and that government has cheerfully sanctioned and encouraged this highly creditable and praiseworthy mark of generosity on the part of the rajah, in thus promoting, at his own personal expense, the convenience and comfort of his countrymen. Mr. Shakespear has accordingly been authorized to afford his aid in giving effect to this laudable intention; and the eminent success which has hitherto attended his singularly curious bridge over the Berai torrent, in so remarkable a season as the present, when the whole country is inundated, and multitudes resort to it as their only succour in passing the torrent, affords sanguine hopes of similar success in his present spirited undertaking, though the span will be little short of three hundred feet*.

---

* There are stone pier-heads built by a Mahratta, which project considerably into the Caramnassa river on both sides, in a line with the military road; these reduce the span to about

The Hindoo, therefore, who saves his sect from pollution by giving a free passage over this dreaded stream cannot fail to be highly applauded, and considered as a public benefactor.

The Caramnassa, or, more correctly, Kerma-nassa, is one of the rivers of India which have rather unaccountably incurred popular odium. The name implies, the destroyer of pious acts, and in a memorial verse, common amongst the natives, the mere contact of its waters is said to counteract all merit previously acquired by attention to the observances of the Hindoo religion. The real motives for pronouncing such a character upon the waters of this stream are utterly unknown, and even the legend professing to explain it is not very familiar to the Pundits. The late Colonel Wilford has introduced it in his first Essay on the Ancient Geography of India; (*Asiatic Researches*, vol. 14). the commencement of a series, which, although believed to be considerably advanced in manuscript, is now, we apprehend, little likely to be given to the public.

The story, as it appears in the account now cited, is this:—

" The waters of this maulee (the same as the Caramnassa) were originally as pure as those of other rivers, until contaminated by an impure admixture which gave te the stream its present character and appellation.

Frisanku, an ancient king of Oude, aspired to elevate

---

230 feet, besides intermediate piers, all available for the purpose of an iron chain-bridge, which might therefore easily be constructed similar to Captain Brown's Trinity pier-head of suspension at Newhaven, near Edinburgh.

himself by pious austerities, to a seat amongst the gods, and, by the aid of Visvamitra, effected his object. Indra threw him down again, but the friendly sage arrested his fall in the mid-heavens, and the matter was compromised by the king's being left suspended in the air with his head downwards. In this awkward position, the saliva from his mouth falls upon the Vindhya mountains, where the Karma-nasa rises, and mingling with its waters, renders them impure throughout their course.

Whatever may be the cause, however, the popular superstition is not the less earnest, and what is worse, practical. A brahmin who has to cross the river is in terrible alarm lest he should be sprinkled by the water, and in no case will he ford it. During the greater part of the year the Caramnassa is fordable, even at its mouth, but travellers by land are carried across it in the arms of a ferryman. In the rains, it of course requires a more respectable conveyance, and passengers are ferried over in boats. Luckily for the people who dwell upon its banks the river is not impure for them, and they are permitted to use and touch its waters with impunity.

The sources of this river have never yet been laid down. Colonel Wilford states it to rise in that part of the Vindhya hills, called Vindhya Maukkra. It separates the provinces of Behar and Benares, and is but a few miles west of Buxar, running into the Ganges between two villages, Perper and Barra, the latter of considerable extent, with several mosques of modern erection.

Bancoorah Post-office,
Sir, July 17, 1823.

I have much pleasure in reporting to you, that your rope bridge of tension and suspension was completed on the 3d ultimo, and has been in full use ever since, over the Berai torrent, near Bissempore, being exceedingly serviceable in safely passing over the public mails and bangy-burdars, who were, as you well know, frequently detained by the torrent for many hours together, to the great detriment of the public service, and frequent injury to the mails and bangys.

Your people were industrious; I was indeed agreeably surprised at the facility with which they erected the bridge, although the model was at hand. And I should have made my report sooner, but I was anxious that it should be accompanied by testimonials, within my own observation, of its stability and efficiency, of which a very marked instance occurred about the middle of last month, when a detachment of sepoys marched over it, almost covering the whole surface with soldiers, cattle, and followers, though such a hasty improvident measure was certainly ill-judged.

A number of gentlemen who have journied, pass the bridge in their palankeens, with bangy-burdars, &c. &c., and have expressed their approbation of the utility and convenience thus afforded, added to the safety with which they got over a dangerous torrent, heretofore only to bo passed by fragile rafts of sola, bamboos and cadgeree-pots, which, I am sorry to add, occasion many casualties every season, at this nullah. We have, however, had several considerable and sudden risings of the waters; indeed I hear, that it is nearly at its full, but this is immaterial, we have nothing to dread, not the slightest accident has occurred, although the width is so great. The standards, which are between fifteen and sixteen feet from the banks, are quite firm, and no pier-heads or abutments are necessary; this alone is a very great point.

It seems a received opinion among the officers with whom I have conversed, that a six-pounder field-piece, with its carriage, &c. may be passed with safety; this, indeed, Colonel Auburey, of the engineers, appeared confident of.

The principal motion, as described by you, is undulating lengthwise, and tends greatly to preserve the bridge, as vibration does not reach the extremities when the cross rollers preserve the rope from friction; and the setting-up rigging, as also the lifts, are easily managed.

The diagonal guys, projected each way from the centre, are very useful in checking lateral motion, whether from wind or any other cause.

There is no drag from the piles; and I see no necessity for any great tension on the strands forming the road-way, on the contrary, especially, too, as the stream cannot touch the ropes, which will always be considerably above the level of the banks; and the torrent not being navigable, a wind-way is all that is necessary.

I am now decidedly of opinion that the tarred coir-rope, so light and buoyant, will last a long time, especially if your plan of removing it after the rains, when the torrent is dry, is carried into effect, and the standards are taken out of the ground. If, however, these latter should be injured by white ants, which I do not apprehend, new ones can be substituted for the expense of cutting down and carriage.

The setting up lanyards, dead eyes, &c. are preserved by being under the rising platform, which also affords occasional shelter to travellers.

I have from the first, when I saw your model in Calcutta, had a favourable opinion of your excellent invention, and I rejoice in the opportunity of giving my unqualified opinion, from personal observation, of its great utility. The natives are astonished and delighted, and pray that they may be multiplied.

I am, Sir,
&c. &c. &c.
(Signed) G. N. Cheek,
Deputy Postmaster.

Colin Shakespear, Esq.
Post-Master-General, Calcutta.

Bancoorah Post-office,
Sir, August 1, 1823.

Since my letter of the 17th July, regarding the bridge, we have had the Berai nullah full for days, and much higher than usual, still nothing has happened to injure the bridge. Trees of enormous size, with all their branches, have been brought down by the torrent, which have passed under the bridge without the slightest accident; in a word, expectation must now be fully realized, as we shall not have the nullah higher than it has been; but if we had, I should not in the least be afraid of any accident whatever.

I am, Sir,
&c. &c. &c.
(Signed) G. N. Cheek,
Deputy Postmaster.

Colin Shakespear, Esq.
Post-Master-General, Calcutta.

Bancoorah Post-office,
Sept. 1, 1823.

Sir,

Considering the almost unheard-of inclemency of the past season, and the novelty of your very interesting experiment, it is with infinite satisfaction I am enabled, at the close of the third month, to report, that your rope bridge stands over the Berai torrent, unaltered in appearance, and apparently uninjured by the excessive wet to which it has been exposed; and the unremitting use to which it has been put, like any other bridge, without restriction, except heavy loaded carts.

Of the very singular properties of the tarred coir-rope I must confess that I had but a very imperfect notion, and I beg to congratulate you on having used it in the construction of your bridge in preference to hempen rope.

The spot on which the bridge is erected, you are aware, is near Bissenpore, on the Benares road; and one coss from the bridge, to the eastward, we find the road leading to Midnapore; of consequence, it is a great thoroughfare: and during the late inundation, which spread over the whole country, the bridge has actually been a rallying point and succour for thousands passing daily, where the use of a ferry was, for lengthened periods, impossible. The progress of the mails must consequently have been checked for several successive days, instead of passing without impediment over a continuous road-way to the great convenience of the public.

From the great number of forest trees torn up by the roots, and precipitated bodily into the torrent, which have passed freely under the rope bridge, the whole width of the nullah, of 130 feet being left clear, it may be doubted whether a bridge of masonry, with diminished arches, on a sandy foundation, would have withstood the tremendous rush of water which has this year filled the torrent even to the overflowing of its high banks; and it is not only the widest, but the most dangerous nullah on the whole route to Benares that I am acquainted with.

I am, Sir,
&c. &c. &c.
(Signed) G. N. Cheek,
Deputy Postmaster.

Colin Shakespear, Esq.
Post-Master-General, Calcutta.

Sir, Bancoorah, October 16, 1823.

I have the honour to report to you, that up to this date the rope bridge over the Berai torrent stands perfectly secure, and is of the greatest use, the water still continuing to run with great rapidity.

The late destructive inundation, which rose two feet and a half above even the high banks of the Berai nullah, and ran with great rapidity over the land pins and ties, washed away the earth about them, also the rising land leading to the approach, so as to endanger the security of the pins, though all braced together. But this did not affect the main standards; and no damage fortunately was done, the road-way being at this critical period full three feet above the stream. The whole fabric, I rejoice to say, is now as strong and complete as the day it was put up before the rains set in, and the natives consider it a boon of inestimable value during the flood, which carried all before it, even to their villages and cattle.

I am, Sir,
&c. &c, &c.
(Signed) G. N. CHEEK,
Deputy Postmaster.

Colin Shakespear, Esq.
Postmaster-General, Calcutta.

[Extract from a letter from Major-General Reynell to Mr. Colin Shakespear, Meeruth.]

September 12, 1823.

" THE more I consider the description and accounts of your rope bridge, the more am I convinced of its hereafter becoming (if fairly brought forward) a most important auxiliary in the warfare of India, that can rarely be carried on in any part of Hindostan which is not divided by rivers, or generally intersected with nullahs, and if I may form an idea of the western side of the Sutlej from the country through which I travelled in approaching the eastern bank, your bridge would be of invaluable advantage in any expedition towards Lahore which the course of events may bring about."

MEMORANDUM.

To adjust the Rope Bridge Model when affected by the temperature of the atmosphere, or any other cause.

IF the main strands fall slack and the roadway should consequently dip, or form the *versed curve,* it will easily be set up by the lanyards and dead eyes. The radiating guys or lifts will then keep it in equilibrio, and an arch or ellipse may be formed at pleasure, in any elevation. In this position the bridge not only looks best, but has less vibration, and is in fact capable of bearing a greater weight.

Remember that the whole tension and weight of the grades is on the main tension rollers, or fulcrum, at *the foot* of the bridge.

If the shackles have been injured by wet, they should be cleaned, and the *iron*-work fresh painted.

C. S.